

E961- COUPP 60 Kg

Detector Status

Searching for Dark Matter with a bubble
chamber

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For the COUPP Collaboration

Introduction

- Technique: weakly superheated fluid in ultra-clean vessel tuned to be sensitive to only high energy density events (not ionization)
 - Adjustable threshold (pressure, temperature) to scan 10 ~ 100 keV events
 - Replaceable target fluid
 - **Currently CF_3I (density 2.0 Kg/l)**
- We have competitive sensitivity for spin-dependent scattering from the 2006 run (Fermilab MINOS hall), despite high radon background in a 2 Kg chamber
 - Now published, *Science*, 319: 933-936 (2008).
- Experiment with 30L (60 Kg) approved in Nov. 2006 (E961)
- Engineering run in PAB Jul. 15 ~ Dec. 1st, 2008
 - Hydraulic system
 - DAQ including illumination and cameras
 - Water tank (muon veto / neutron shield system)

Components

- Pressure Vessel & Hydraulic compression system
- Synthetic quartz vessel with high purity CF_3I
 - at least 2 orders of magnitude in background reduction
 - Maintain >80% livetime (bubbles on walls from α decays in quartz)
- Illumination and camera system
- DAQ
 - Trigger - observation of a single bubble
 - Data - chamber pictures + state info (pres, temp, etc.)
- Muon Veto - water tank with pmts (also neutron shield)

Assembly at PAB

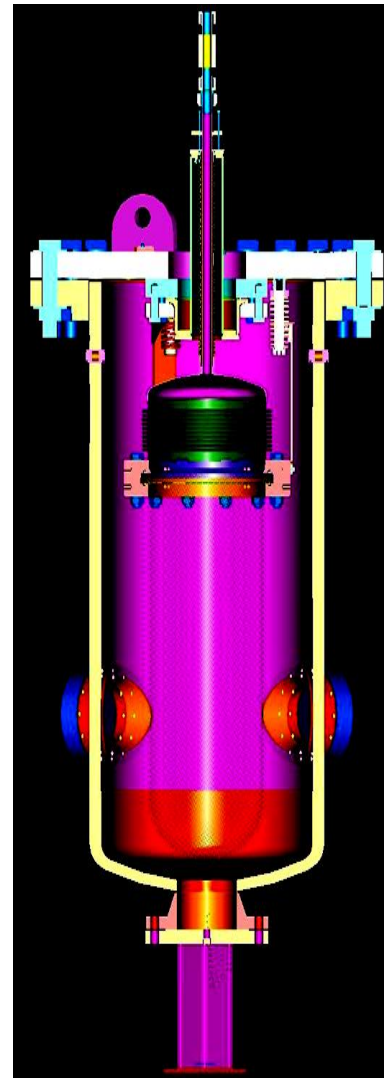


Quartz vessel

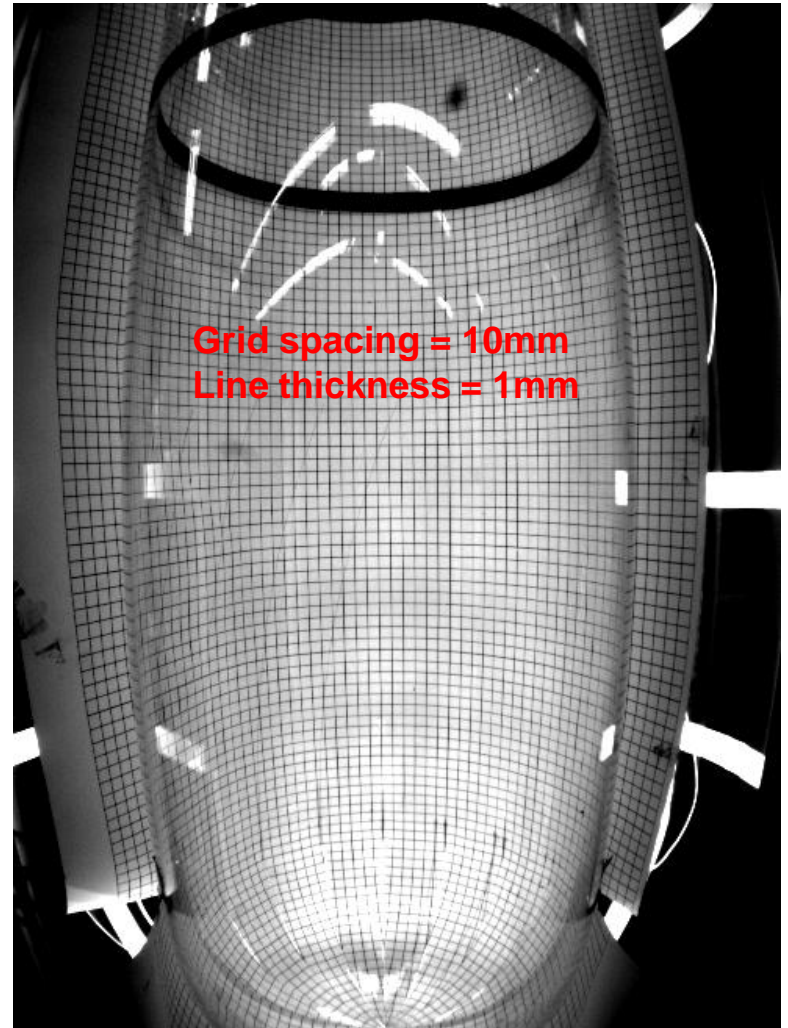
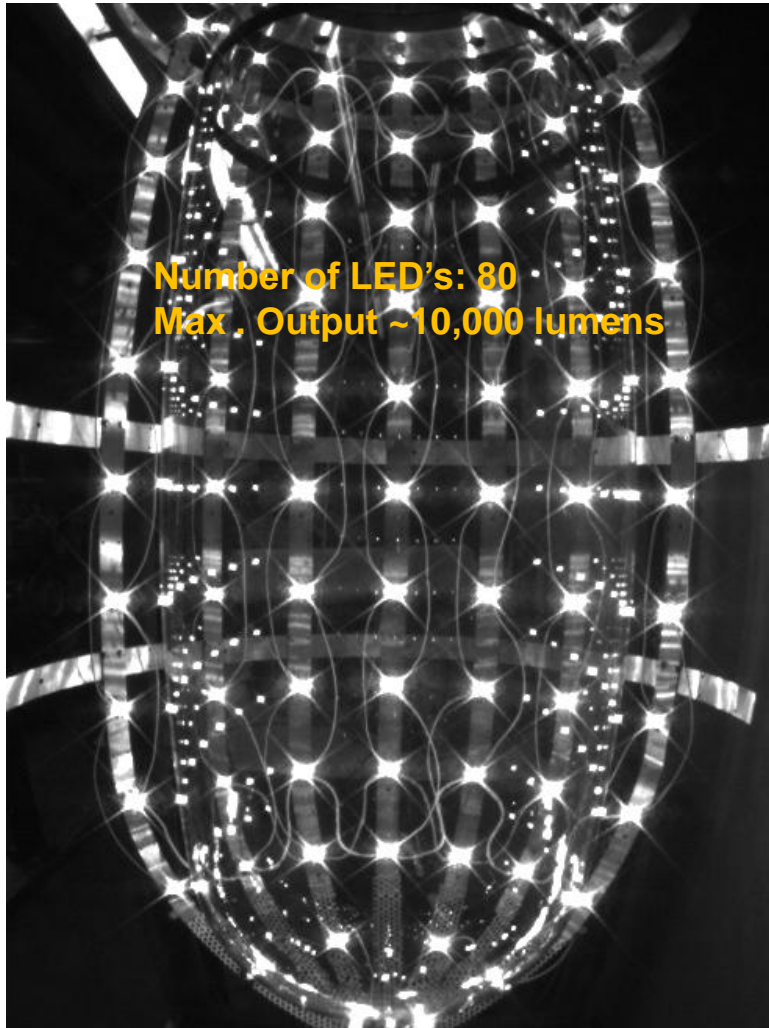


Quartz vessel without LED and diffuser

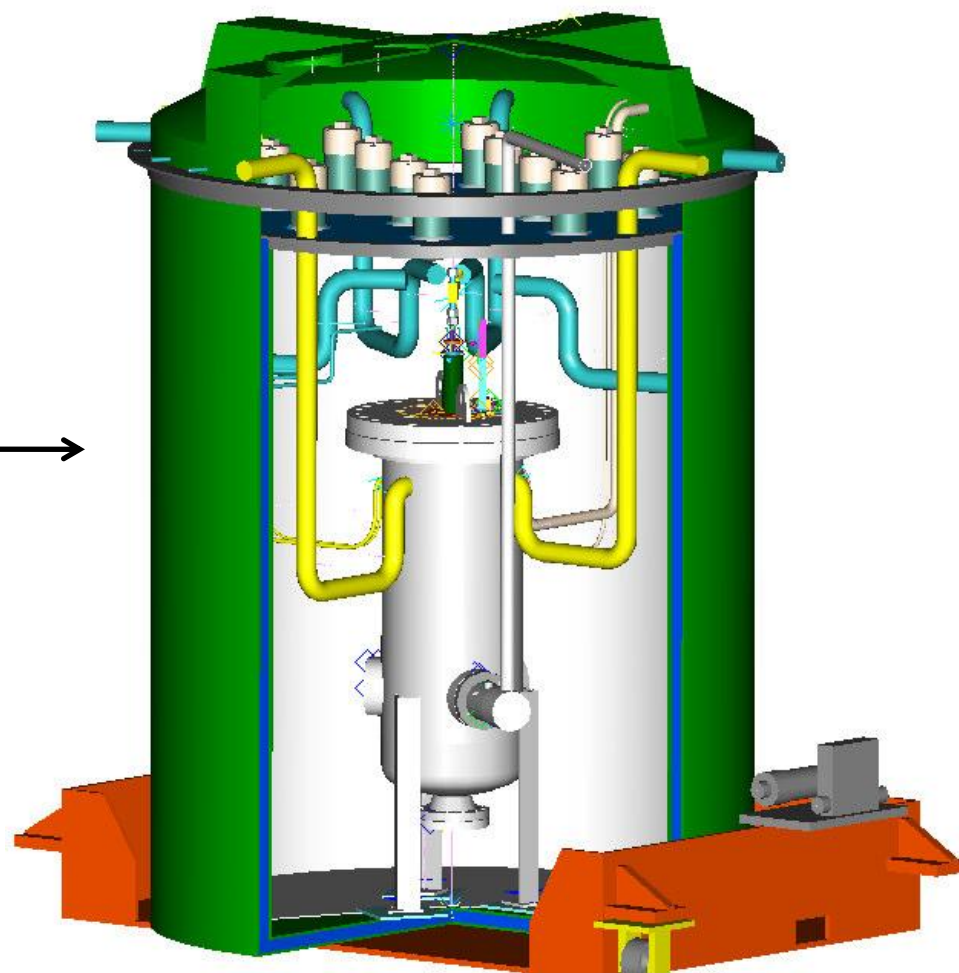
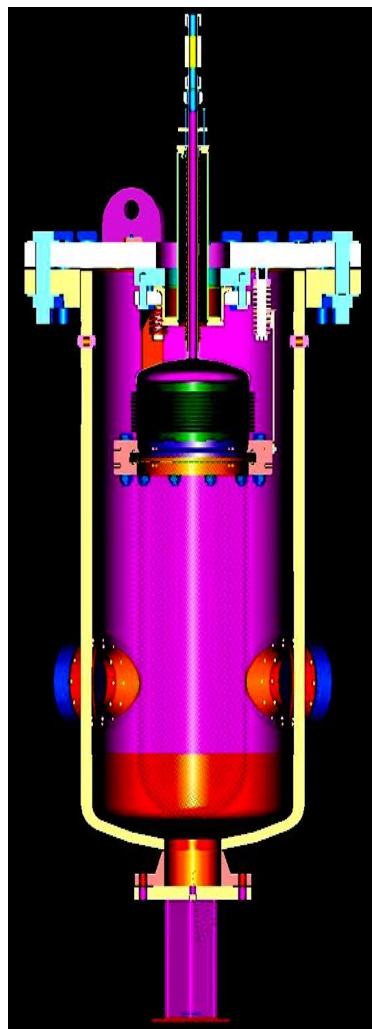
—————→
...to be installed inside
pressure vessel



LED grid finished, diffuser in progress



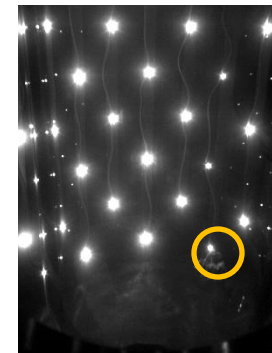
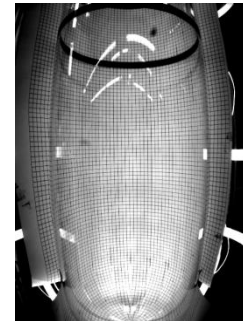
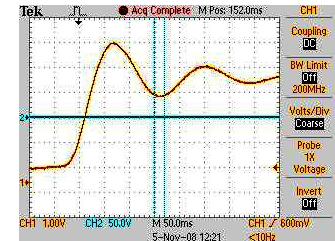
Water Muon Veto / neutron shield



COUPP 60 kg vessel in water veto tank 10-22-08, D. Pushka

Status

- Pressure vessel & compression system tested successfully with a natural quartz jar
- Final lighting system installing now
- Muon Veto
prototype - plenty of light tanks delivered
- Bubbles seen in small CF_3I volume (movie)



Next...

- Review on Wednesday, Dec. 10
- Diffuser and fine tuning optics in December, 2008
- DAQ, Trigger, and Camera programming and tests will continue through winter
- Then
 - Clean and Install synthetic quartz jar
 - Commission chamber & veto in MINOS hall
 - Better Dark matter limits